

NON-PUBLIC?: N
ACCESSION #: 9302250210
LICENSEE EVENT REPORT (LER)

FACILITY NAME: LaSalle County Station Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000373

TITLE: Unit 1 Manual Scram Due To 'A' SRV Being Stuck Open Due
To Duct Tape Being Over The Actuator's Air Valve Manifold
Exhaust Port

EVENT DATE: 01/26/93 LER #: 93-002-00 REPORT DATE: 02/25/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 018

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(i), 50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Michael W. McLain, Systems TELEPHONE: (815) 357-6761
Engineering Department, Extension
2576

COMPONENT FAILURE DESCRIPTION:

CAUSE: A SYSTEM: SB COMPONENT: MANUFACTURER:

REPORTABLE NPRDS: Yes

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On January 26, 1993 Unit 1 was in Operational Mode 1 (Run) at 18 percent power.

During the performance of LaSalle Operating Department Surveillance, LOS-MS-R2, "Main Steam Safety Relief Valve Manual Cycling Test for Conditions 1, 2 or 3", Unit 1 Safety Relief Valve (SRV) 'A' (EPN 1B21-F013A) failed to close when operated by the Nuclear Station Operator (NSO). Several attempts were made to close the SRV but were

unsuccessful. Upon the Shift Engineer's authorization, the reactor was manually scrammed, per LaSalle Operating Abnormal Procedure LOA-NB-02, at 2320 hours. The reactor mode switch was placed into the Shutdown

position and scram recovery actions were initiated. 'A' SRV closed at 2334 hours, with no deliberate NSO action. Reactor pressure, at this point, had decreased to 340 psig. Other procedural actions were then taken to place the reactor into a Cold Shutdown condition.

Subsequent investigations revealed that 'A' SRV was pneumatically locked into a partially open position. This was caused by duct tape blocking the pneumatic operator's Air Valve Manifold Exhaust Port. The SRV was able to open but air was not allowed to exhaust and therefore the SRV would not fully close. The duct tape eventually ripped away from the port, allowing air to exhaust and thus closing the SRV.

This event is reportable to the Nuclear Regulatory Commission per the requirements of 10CFR50.73(a)(2)(iv) any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF) and 10CFR50.73(a)(2)(i)(A) completion of any Nuclear Plant Shutdown required by Technical Specification.

END OF ABSTRACT

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PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as XX!.

A. CONDITION PRIOR TO EVENT

Unit(s): 1 Event Date: 1/26/93 Event Time: 2315 Hours

Reactor Mode(s): 1 Mode(s) Name: Run Power Level(s): 18%

B. DESCRIPTION OF EVENT

On January 26, 1993, at approximately 2315 hours, Unit 1 was in Operational Condition 1 (Run) at 18% power. At this time, LaSalle Operations Department was performing surveillance LOS-MS-R2, "Main Steam Safety Relief Valve Manual Cycling Test For Conditions 1, 2 or 3", when the Unit 1 NSO attempted to cycle Main Steam (MS) SB! Safety Relief Valve (SRV) 'A'. The 'A' SRV Control Switch (C/S) was placed into the open position and all indications showed that the SRV had opened, including MS Bypass Valve (BPV) position dropping from 2.5 to 0.9 BPV and 'A' SRV Tailpipe Temperature increasing.

Upon placing the C/S into the auto position, the valve apparently failed to close. Both the open and closed indication lights were now deenergized. The NSO then checked the light indications for failed bulbs and found the bulbs were good.

Bypass valve position was now at 1.9 BPV and tailpipe temperature was still elevated. These items, along with the known fact that the SRV magnetic reed switch position indicating system will exhibit dead bands or non-continuous position indication lead to the conclusion that the SRV was mid-positioned.

At 2318 hours on 1/26/93, the Shift Engineer was notified of a stuck open SRV and a two minute timeclock was initiated, per LOA-NB-02, that called for closing the SRV or scrambling the reactor. The fuses for 'A' SRV, 1B21C-F31 and 1B21C-F32, at Panel 1H13-F628 in the Auxiliary Electric Equipment Room (AEER), were pulled and then replaced. This resulted in no change to SRV position indication, BPV position indication or tailpipe temperature. The 'A' SRV C/S was cycled again and the OPEN indication light became energized but then deenergized when the C/S was placed into AUTO. Throughout the C/S cycling there were no changes in BPV position indication or tailpipe temperature. The above mentioned fuses were pulled again and then reinstalled with no changes to SRV position indication, BPV position indication, or tailpipe temperature. The C/S was cycled for the third time, with no changes to the BPV position indication or tailpipe temperature but the OPEN indication light remained energized. The Shift Engineer, at 2320 hours on 1/26/93, then instructed the Unit 1 NSO to manually scram the reactor.

Normal scram recovery actions were begun and several noteworthy conditions and indications occurred. Following the manual scram, four control rods (CR) (CR #s 34-03, 42-39, 46-43 and 14-51) appeared to have traveled past their full-in position and then drifted back to the zero "00" position. The last of these control rods to reach position 00 was CR #14-51, which occurred at 2325 hours. This type of CR drift is an expected evolution. At 2331 hours the Suppression Pool (SP) water level reached +4.6 inches, exceeding the +3 inch limit (Technical Specification 3.6.2.1). The SP level increased because of the SRV blowdown and corrective actions were undertaken per LaSalle General Abnormal Procedure

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B. DESCRIPTION OF EVENT CONTINUED

LGA-03, "Primary Containment Control". Normal pool level was

restored to 2.7 inches at 0027 hours, on 1/27/93, and LGA-03 was exited. At 2330 hours, on 1/26/93, the Outboard Main Steam Isolation Valves and associated Main Steam Line Drain Valves were closed to control the Reactor Pressure Vessel cooldown rate. The Reactor Pressure Vessel cooldown rate was limited to 96 degrees Fahrenheit (F) in a one hour period, as determined from Reactor Recirculation (RR) AD! suction temperatures. The cooldown rate did not exceed the 100 degrees F in any one hour per Technical Specification 3.4.6.1.

At 2334 hours on 1/26/93, 'A' SRV position indication showed that the valve had closed. This was verified by SRV Tailpipe Temperature indication. The SRV had been open for approximately 18 minutes and Reactor pressure during this time had decreased from 930 psig to 340 psig. No deliberate NSO actions were taken to close the valve.

C. APPARENT CAUSE OF EVENT

The apparent cause of 'A' SRV failing to close is attributed to its pneumatic (or air) actuator's inability to exhaust its control air supplied by the Instrument Nitrogen, (IN) LE! System. This was caused by duct tape found over the actuator's Air Valve Manifold Exhaust Port. The duct tape did not prevent the SRV from opening but did not allow the SRV to close. Duct tape was also found on the pneumatic air cylinder's vent.

The air valve controls the pathways for 100 psig IN that travels to the bottom side of the actuating piston, inside the air actuator cylinder. When the SRV C/S is taken to open, an associated SRV solenoid energizes and positions the air valve to port 100 psig IN to the bottom side of the air actuator's operating piston. This upward force is transferred to the SRV, via a mechanical lever or "dog" assembly, such that the main SRV spring is overcome and the SRV opens. Also, the IN above the piston, is exhausted to Drywell (DW) atmosphere through the air actuator cylinder vent. When the SRV C/S is taken back to the AUTO position, the associated solenoid de-energizes and the air valve repositions. The 100 psig IN supply is cutoff and the volume of IN, on the underside of the air actuator piston, exhausts to atmosphere via the air valve manifold. Also, DW atmosphere is drawn into the air actuator, to the top side of the actuating piston, through the cylinder top vent.

With duct tape covering the exhaust port on the air valve manifold and duct tape on the actuator cylinder top vent, the air actuator will be pneumatically locked into the open condition and the SRV will be unable to close. This is caused by the 100 psig IN on the

underside of the actuator piston, not being able to exhaust through the air valve manifold and therefore blocking any movement of the actuator piston. When the duct tape finally bubbled-up and ripped away from the exhaust port, the SRV closed. It is also very likely that the duct tape on the cylinder top vent was partially blown clear when the SRV was opened and then was drawn back into the vent hole on the closing stroke of the piston. This tape may have had some affect on how the air actuator operated, in that, it may have caused a small vacuum block on the top side of the piston which added resistance to the piston movement.

The two pieces of duct tape that were found on 'A' SRV were installed as cleanliness boundaries. SRV was reworked and tested at Wyle Labs prior to installation during LaSalle's Unit 1 Fifth Refuel Outage (L1R05) fall of 1992. The duct tape was placed on to the SRV by Wyle Lab Technicians per their QA procedures for the shipment back to LaSalle Station. LaSalle Mechanical Maintenance Department (MMD) is responsible for the SRV installation and they oversee the contractor personnel that perform the actual work. The SRV installation is governed by MMD procedure LMP-MS-06, "Removal/Installation of Main Steam Safety Relief Valves". Interviews with MMD and contractor personnel revealed that all craft personnel were aware of

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C. APPARENT CAUSE OF EVENT CONTINUED

the duct tape and that common cleanliness practices were followed. All procedural precautions and limitations were followed and good work practices, pre-job briefings and shift turnovers were utilized. No procedural discrepancies or abnormalities were noted during the installation process and there was adequate supervision from contractor management.

Also discussed during the interviews were the procedural steps that govern cleanliness control and duct tape removal. There are specific steps in LMP-MS-06 for cleanliness control and duct tape removal but only the cleanliness control step has a supervisory signoff. The cleanliness control stop states the cleanliness class to be maintained during the air actuator assembly installation but does not encompass the tape removal. The duct tape removal step clearly identifies the correct exhaust port but does not require any craft or supervisory signature for step completion. Also the procedure does not identify the removal of the duct tape on the actuator cylinder top vent.

Contributing factors to the root cause determination for this problem include the following; during the initial investigation it was noted that the duct tape found on 'A' SRV was silver colored and that the air valve, which is made of aluminum, also has a silver color. This made the tape somewhat hard to see. Also the air valve manifold exhaust port is physically located on the bottom rear portion of the air valve assembly and once the SRV is installed, it takes some effort to locate and inspect it. Inspection of the remaining seventeen SRVs revealed two other SRVs had duct tape on their air valve manifold exhaust ports; 'D' SRV (EPN 1B21-F013D) and 'V' SRV (EPN 1B21-F013V). The duct tape on both of these valves appeared to have ripped away and were not blocking the air valve manifold exhaust ports. Both of these SRVs had been cycled prior to 'A' SRV but it appears that their exhaust ports were cleared of the duct tape during the SRV testing during Unit startup for L1R04 4th refuel Spring of 1991. A review of maintenance records revealed these two SRVs were installed during L1R04 and that the duct tape was placed on the SRVs for cleanliness purposes, the same reasoning for its use on 'A' SRV by Wyle Lab Technicians. Also both 'D' and 'V' SRV's are Automatic Depressurization System (ADS) SRVs and utilize 175 psig IN as control air. At this pressure the duct tape would have had additional force applied to it and may have ripped away with less resistance. Therefore, no abnormalities in their operation were noted.

The root cause for 'A' SRV failing to close is attributed to a personnel error. An unidentified contractor worker failed to remove the duct tape from the Air Valve Manifold Exhaust Port, even though there were procedural guidance and instructions to do so. There are several secondary and/or contributing factors as to why the tape was not removed but the final reason is unknown.

D. SAFETY ANALYSIS OF EVENT

The safety consequences of this event are minimal. Compliance with all of the procedural requirements stated in LOA-NB-03, "Stuck Open Safety Relief Valve", ensured that this was true. This transient is addressed in UFSAR Chapter 15.6.1, "Inadvertent SRV Opening". In this accident analyses, it is noted that if the SRV cannot be closed, then reactor power should be decreased. This would mitigate the consequences of the mild depressurization event taking place. Also, UFSAR Chapter 15.6.1 states that Suppression Pool (SP) Temperature should be monitored very closely, to ensure that the reactor is shutdown when the SP temperature setpoint is reached.

Technical Specifications 3.4.2 and 3.6.2 set this limit at a temperature of 110 degrees Fahrenheit (SP temperature increased to approximately 70 degrees Fahrenheit during this event). Suppression pool cooling was already in operation for the SRV testing.

Technical Specification 3.4.2 also sets a two minutes timeclock that gives the Unit Operators the opportunity to close the SRV (four attempts before a manual scram). All of these points are conservatively incorporated into LOA-NB-03, "Stuck Open SRV". This procedure was followed by the NSO and the Unit was placed into a safe condition.

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E. CORRECTIVE ACTIONS

A troubleshooting team (MMD, Electrical Maintenance, Technical Staff, and Operations) entered the DW on 1/27/93 to perform a visual inspection on 'A' SRV. It was at this time that the duct tape was found on the Air Valve Manifold Exhaust Port and Cylinder Top Vent. The duct taps found on the Air Valve Manifold Exhaust Port exhibited evidence of bubbling and ripping. The team removed the duct tape and then began to inspect the SRV for any apparent mechanical abnormalities; none were found. Following this the team then inspected the remaining seventeen SRVS. As mentioned earlier, 'D' and 'V' SRVs also had duct tape on their exhaust ports (but no duct tape on their cylinder top vents). This duct tape was also removed. No other abnormalities were reported by this team.

MMD procedure, LMP-MS-06, "Main Steam Safety Relief Valve Manual Cycling Test for Conditions 1, 2 or 3", did not require any signature for step completion concerning the tape removal. MD has submitted a procedure change that will require a supervisory sign-off for the tape removal. This sign-off will also encompass the tape removal from the Air Actuator Cylinder Top Vent, Solenoid Valve Exhaust Ports and SRV Bonnet Vent. Drawings will also be added that will specifically label all of these vents and ports.

A review of Maintenance Procedures, that involve cleanliness requirements, will be performed. Determination will be made as to any applicable procedures that need similar enhancement to LMP-MS-06. These procedure reviews/revisions will be tracked by Action Item Record (AIR) 373-180-93-00901.

On 1/27/93, EMD replaced the solenoid and air valve for 'A' SRV, 1B21-F013A. There was no evidence of any type of damage to these components but they were replaced on the grounds of thoroughness.

Both the solenoid and air valve will be tested at Wyle Labs at the next scheduled testing opportunity. These components will be installed into a spare slot on one of the non-ADS SRVs and then tested per the Wyle Labs Air Actuator Test Procedure. The testing and test results will be tracked by EMD per LaSalle (AIR) 373-180-93-00902.

The eighteen SRVs that are currently installed in LaSalle Unit 2 will be inspected for the presence of duct tape at any exhaust ports or vents. This will be accomplished during the next available forced or refuel (L2R05) outage. All eighteen Unit 2 SRVs cycled satisfactorily, per LOS-MS-R2, "Main Steam Safety Relief Valve Manual Cycling Test for Conditions 1, 2 or 3", during Unit startup following L2R04. At that time no discrepancies or abnormalities were noted. This inspection will be tracked and reported, by MMD, per AIR 373-180-93-00903.

On 1/28/93 Operations Department completed surveillance LOS-MS-R2. "Main Steam Safety Relief Valve Manual Cycling Test for Conditions 1, 2 or 3". All of the remaining SRVS, including 'A' SRV, cycled satisfactorily.

F. PREVIOUS EVENTS

None.

G. COMMENT FAILURE DATA

None.

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"Event Summary and Cause Codes" omitted.

ATTACHMENT 1 TO 9302250210 PAGE 2 OF 2

Commonwealth Edison
LaSalle County Nuclear Station
2601 N. 21st. Rd.
Marseilles, Illinois 61341
Telephone 815/357-6761

February 25, 1993

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

Mail Station P1-137
Washington, D.C. 20555

Dear Sir:

Licensee Event Report #93-002-00, Docket #050-373 is being submitted to your office in accordance with 10CFR50.73(a)(2)(iv) and 10CFR50.73(a)(2)(i)(A).

G. F. Spedl
Station Manager
LaSalle County Station

GFS/MWM/mkl

Enclosure

xc: Nuclear Licensing Administrator
NRC Resident Inspector
NRC Region III Administrator
INPO - Records Center
IDNS Resident Inspector

*** END OF DOCUMENT ***
